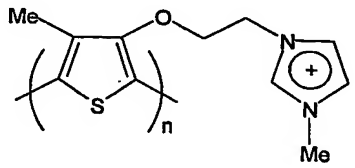
WHAT IS CLAIMED IS:

1. An optical sensor for detecting a target comprising a single-stranded aptamer complementary to said target, and a water-soluble cationic polythiophene derivative of the following formula:



wherein "n" is an integer ranging from 6 to 100.

2. An optical sensor as defined in claim 1, wherein said target is selected from the group consisting of potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides.

3. An optical sensor as defined in claim 1, wherein said aptamer is an oligonucleotide.

4. An optical sensor as defined in claim 3, wherein said oligonucleotide is single-stranded DNA.

5. An optical sensor as defined in claim 4, wherein said single-stranded DNA has the following sequence:

5'-GGTTGGTGTGGTTGG-3'.

6. An optical sensor as defined in claim 5, wherein said target is human α-thrombin.

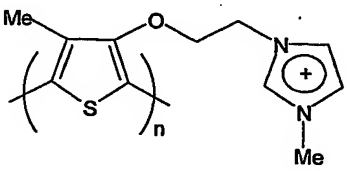
7. An optical sensor as defined in claim 4, wherein said single-stranded DNA has the following sequence:

5'-ATTATACCTGGGGGAGTATTGCGGAGGAAGGTATAAT-3'.

8. An optical sensor as defined in claim 7, wherein said target is D-adenosine.

9. A method for detecting a target comprising the steps of:

a) contacting a sample suspected of containing the target with an optical sensor, said optical sensor including a single-stranded aptamer complementary to said target, and a water-soluble cationic polythiophene derivative of the following formula:



wherein "n" is an integer ranging from 6 to 100; and

b) detecting binding of the aptamer to the target by measuring an optical signal.

10. A method as defined in claim 9, wherein said optical signal is a UV-Visible absorption or fluorescence spectrum.

11. A method as defined in claim 10, wherein said target is selected from the group consisting of potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides.

12. A method as defined in claim 10, wherein said aptamer is an oligonucleotide.

13. A method as defined in claim 12, wherein said oligonucleotide is single-stranded DNA.

14. A method as defined in claim 13, wherein said single-stranded DNA has the following sequence:

5'-GGTTGGTGTGGTTGG-3'.

15. A method as defined in claim 14, wherein said target is human α-thrombin.

16. A method as defined in claim 13, wherein said single-stranded DNA has the following sequence:

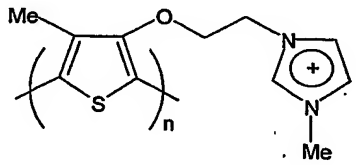
5'-ATTATACCTGGGGGAGTATTGCGGAGGAAGGTATAAT-3'.

17. A method as defined in claim 16, wherein said target is D-adenosine.

18. A method for detecting a target comprising the steps of:

a) contacting a sample suspected of containing the target with an aptamer known to be complementary to the target;

b) further contacting the sample with a water-soluble cationic polythiophene derivative of formula:



wherein "n" is an integer ranging from 6 to 100; and

c) detecting binding of the aptamer to the target by measuring an optical signal.

19. A method as defined in claim 18, wherein said optical signal is a UV-Visible absorption or fluorescence spectrum.

20. A method as defined in claim 19, wherein said target is selected from the group consisting of potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides.

21. A method as defined in claim 19, wherein said aptamer is an oligonucleotide.

22. A method as defined in claim 21, wherein said oligonucleotide is single-stranded DNA.

23. A method as defined in claim 22, wherein said single-stranded DNA has the following sequence:

5'-GGTTGGTGTGGTTGG-3'.

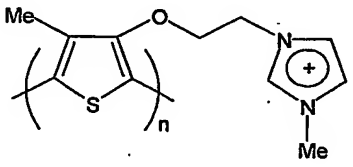
24. A method as defined in claim 23, wherein said target is human α-thrombin.

25. A method as defined in claim 22, wherein said single-stranded DNA has the following sequence:

5'-ATTATACCTGGGGGAGTATTGCGGAGGAAGGTATAAT-3'.

26. A method as defined in claim 25, wherein said target is D-adenosine.

27. Use of an optical sensor comprising a single-stranded aptamer and a water-soluble, cationic polythiophene derivative of formula:



wherein "n" is an integer ranging from 6 to 100, for detecting a target, said aptamer being complementary to said target.

28. A use as defined in claim 27, wherein said target is selected from the group consisting of potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides.

29. A use as defined in claim 28, wherein said aptamer is an oligonucleotide.

30. A use as defined in claim 29, wherein said oligonucleotide is single stranded DNA.

31. A use as defined in claim 30, wherein said single stranded DNA has the following sequence:

5'-GGTTGGTGTGGTTGG-3'.

32. A use as defined in claim 31, wherein said target is human α-thrombin.

33. A use as defined in claim 30, wherein said single-stranded DNA has the following sequence:

5'-ATTATACCTGGGGGAGTATTGCGGAGGAAGGTATAAT-3'.

34. A use as defined in claim 33, wherein said target is D-adenosine.

35. A method as defined in claims 15 and 24 wherein said human α-thrombin is present in an amount of at least 2×10^{-15} mol.

36. A method as defined in claims 17 and 26 wherein said D-adenosine is present in an amount of at least 2×10^{-14} mol.